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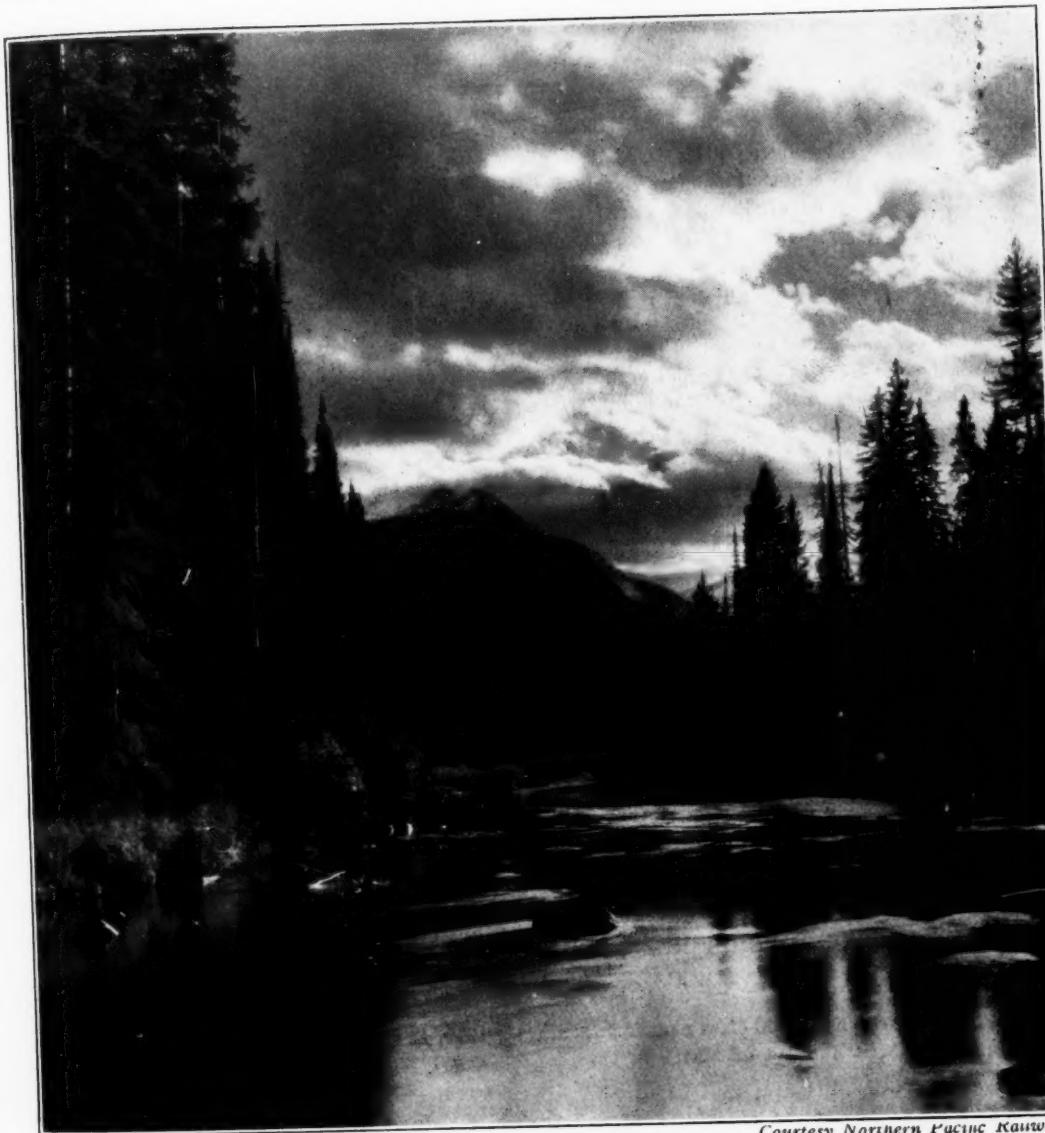

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VOLUME XXVI APRIL, 1927 NUMBER 4

NICARAGUA

REVOLUTION AND INTERVENTION

ROBERT S. PLATT
University of Chicago

Revolution in Nicaragua is natural. Intervention by the United States is likewise natural. But "natural" does not mean "inevitable." Either of these activities can be done away with; perhaps both could be eliminated.

CAUSES OF REVOLUTION

Revolution is natural as a Nicaraguan heritage. Since the Spanish colonial régime, ideas of democracy, popular will, majority rule, and compromise agreement have not entered into government; political power has been looked upon entirely from the viewpoint of personal spoils. At the same time no one group has been able long to dominate the country unchallenged by a rival. In the absence of democratic methods, revolution is the only machinery for changing the controlling group.

In various other Central American countries governmental changes are rare or are brought about by other means. In Costa Rica, where national political life resides in a compact productive plateau, changes occur regularly in democratic fashion under the stabilizing influence of a prosperous landed population. In Panama, where the center of interest is a commercial crossing place now occupied by the canal, changes occur peacefully or not at all under inexorable foreign supervision.

There are reasons for the persistence of revolution in Nicaragua. Potentially the country has both an agricultural area comparable in productivity to the heart of Costa Rica and a crossing place comparable to the heart of Panama. Yet Nicaragua enjoys neither, partly because it has both. Interest has been divided. When both the overland trade crossing and the productive land were used under Spanish rule, rival communities arose with divergent interests, commerce centered at Granada, production at

Leon. Today the communities persist as rival centers of bitterly antagonistic factions, while the crossing place is unused and the productive land is idle. There is no longer great divergence of interest between the Conservatives of Granada and the Liberals of Leon, but the feud continues.

THE CANAL PHANTOM

In modern times Nicaraguan attention has been wasted on the canal project, a dream unrealized. The Nicaraguan canal route*

FIG. 1. Sketch map of Nicaragua

is longer than the Panama route and more subject to earthquakes, but it is nearer to the United States, is lower at the divide and includes the navigable lake with its river outlet to the Caribbean Sea.

When choice was made between the two routes expert opinion was divided. Some favored the Panama route because they be-

* As may be seen on the map, the proposed canal route follows the San Juan River from the Caribbean Sea to Lake Nicaragua and thence cuts across to the Pacific at a low point in the divide without passing thru Granada or any of the more populous districts.

lieved that a sea-level canal could be built there, as would have been impossible thru Lake Nicaragua. When later a lock canal was found preferable even for the Panama route, this reason for favoring Panama lost its force, and an earlier discovery of the fact might have turned the scale to Nicaragua. Moreover, the final decision in favor of Panama is said to have been influenced by so slight a factor as a timely display in the United States Senate of Nicaraguan postage stamps bearing a picture of the beautiful volcano in Lake Nicaragua. However that may be, the choice of the Panama route brought disappointment and depression to Nicaragua, and subsequent suggestion of a second canal has done little more than raise the ghost of a distracting idea.

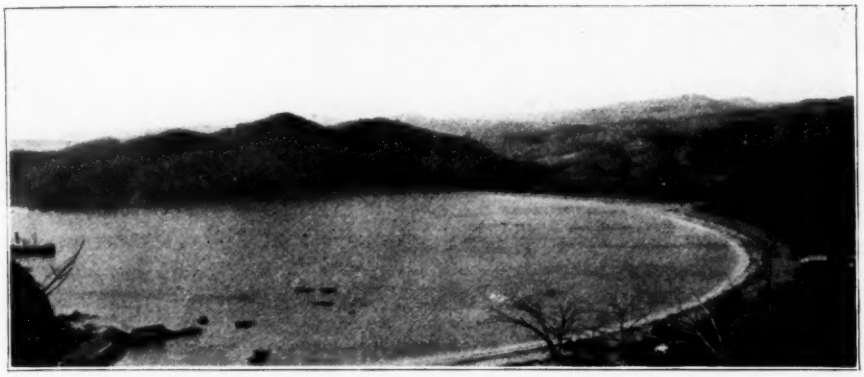

FIG. 2. Harbor of San Juan del Sur near the Pacific end of the Proposed Nicaraguan Canal Route

The crossing place, inferior to none potentially, is inferior to all practically; the Nicaraguan who wishes to cross his country from coast to coast goes regularly to Panama for the crossing. For commerce the east coast is farther from the capital of the country than it is from the United States. Even Costa Rica has better overland crossing facilities, by rail, in spite of mountain barriers. The Costa Rican facilities have indeed been developed not simply in spite of but on account of the highlands, since these railways are not primarily for a route across the isthmus but are the connections of a progressive central plateau with both its coasts. In Nicaragua there is no such important highland center within reach of both coasts.

OTHER HINDRANCES

It must be added that other disadvantages have retarded Nicaragua, in addition to futile distraction of interest and historic

rivalry of communities and factions. The productive area is a hot lowland instead of a healthful plateau. The rural population is of Indian or mixed blood, poor, inarticulate, and landless. Transportation is undeveloped not only to cross the country but also to reach outlying districts in general.

The country is caught in a vicious circle. Inadequate transportation is a result and a cause of instability; and even more is this true of economic stagnation. Revolution destroys economic incentive, and lack of economic incentive encourages revolution as a more attractive opportunity for gain. Short-lived predatory

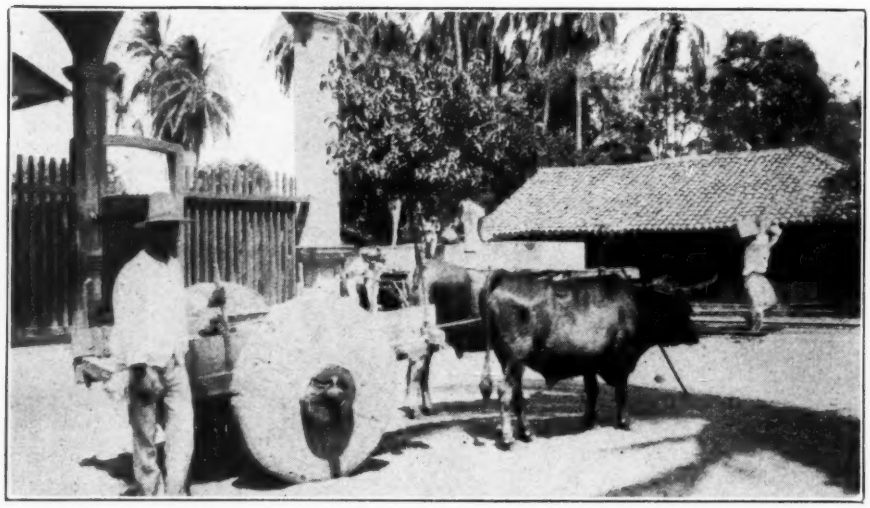

FIG. 3. The ox-cart is the best available means of transportation to connect with the railway. This picture was taken at Corinto

governments do not build roads nor instill confidence in private builders. On the other hand, lack of roads makes it easy for revolutionists to gain a foothold in outlying districts beyond the reach of a central government and to strike unexpectedly at the heart of the country.

RECENT LOCALIZATION AND TRANSPORTATION

Recent operations are typical. The Conservative government held the heart of the country, the populous districts between the lakes and the Pacific served by the railway, and beyond this small area had a very tenuous hold. Liberal forces established themselves on the remote east coast, proclaiming their capital there and probably receiving support by sea. Other Liberal forces, en-

tirely separate from the first, began operations in the northwestern part of the country, probably receiving support across the border of Honduras. These could maneuver out of reach of the Conservative forces and yet threaten the heart of the country, particularly more northern cities along the railway, where the population favors the Liberal faction.

American Marine occupation took form accordingly. Neutral zones included the areas of Liberal activity along the east coast and in the northwest, and the heart of the country along the railway. Marine operations on the opposite coasts were separate, and

FIG. 4. A street in Corinto. Lack of vehicle traffic is indicated by clothes spread to dry in the street

transportation between the two was by way of Panama. Whether or not neutralization extends over the whole country matters little, for outside of the zones mentioned the country is largely inaccessible and useless to all parties. This is even true of the canal route, undeveloped, unoccupied and of no immediate significance, altho it was said to be one of the reasons for intervention, and indirectly it probably was so.

REASONS FOR INTERVENTION

Reasons for intervention are not lacking. Intervention at this time by the United States is as natural as the revolutions which it seeks to prevent. To accuse "Big Business" of insidious influence is superfluous; American investments in Nicaragua are relatively

small. Larger American companies and more capital are involved in most of the other Central American countries, and business suffers more from loss of good will in general than from revolution locally.

More obvious reasons are sufficient. It is in accordance with the nature of the State Department to be concerned about Central American turmoil, because of the Panama Canal as a vulnerable and vital bit of the United States; because of American citizens and property, however insignificant, in the region; because of threatened European activity there; because of the impulse to

FIG. 5. View across Corinto Bay toward lowland plains showing rural house, and cotton plant grown into tree and covered with ripe cotton bolls

reform other nations, and because of that mighty guide, precedent. Step by step, it has been natural to recognize a government which seemed to have complied with constitutional forms and to be in control, then to respond to urgent requests from that government for support against foreign aggression, and then to put Marines back where they were eighteen months ago.

RESULTS OF INTERVENTION

Revolution, even tho natural, is not considered inevitable by those who intervene. Intervention, in turn, is natural but not inevitable nor necessarily excusable. Intervention is always unfortunate, involving interference with affairs in an independent nation. The best that can be said for it is that it may be less bad

than revolution. Intervention by the United States in Nicaragua is considered sincerely by many Americans to be unwise, unjust or even immoral policy; by many Nicaraguans to be intolerable oppression; and by many other Latin Americans to be fearful evidence of treacherous and insidious aggression threatening the whole western hemisphere.

Perhaps intervention is not a matter of wickedness, as implied in these opinions, but simply of awkwardness in trying to accomplish a good purpose. But this does not make the line of action any more desirable. These opinions represent a loss of good will, which may be a greater evil than the revolution itself.

OBJECTIVES AND A POLICY

Any satisfactory policy must take into consideration not only the elimination of revolution in Nicaragua but also the maintenance of good will in America and the world. Good will is a rich endowment slowly gained but quickly destroyed by a temporary lapse of statesmanship. To maintain it foreign policy must be trustworthy and consistent thru changing administrations. It is difficult but perhaps possible to have both peace and good will.

Probably revolution in Nicaragua cannot be eliminated in the near future without interference by outsiders. The best excuse for interference seems to lie in the prospect of its breaking the vicious circle; that stability imposed temporarily from without may lead to permanent stability from within.

At the same time it is probable that the United States cannot retain the confidence of Latin America by interfering single-handed in Nicaragua or elsewhere. Latin America is not to be dragged into Pan-Americanism under the domination of the United States, but will be driven into Pan-Latinism unless given opportunity to co-operate freely and equally with a self-denying United States.

Nicaragua offers a good practice field in which the United States might initiate and abide by co-operative committee action of Pan-American nations. Revolution might not be so quickly subdued, but some very valuable treasures might be salvaged.

NOTES ON THE GEOGRAPHY OF TRINIDAD

PRESTON E. JAMES
University of Michigan

The name Trinidad is commonly associated with asphalt. Yet in Trinidad only a few people are directly interested in this resource; and the community around Pitch Lake and the oilfields near by differs greatly from the other communities of the island.[1]

A fair proportion of Trinidad is suitable for agriculture (Fig. 1), and in the lives of most of the inhabitants, the production of

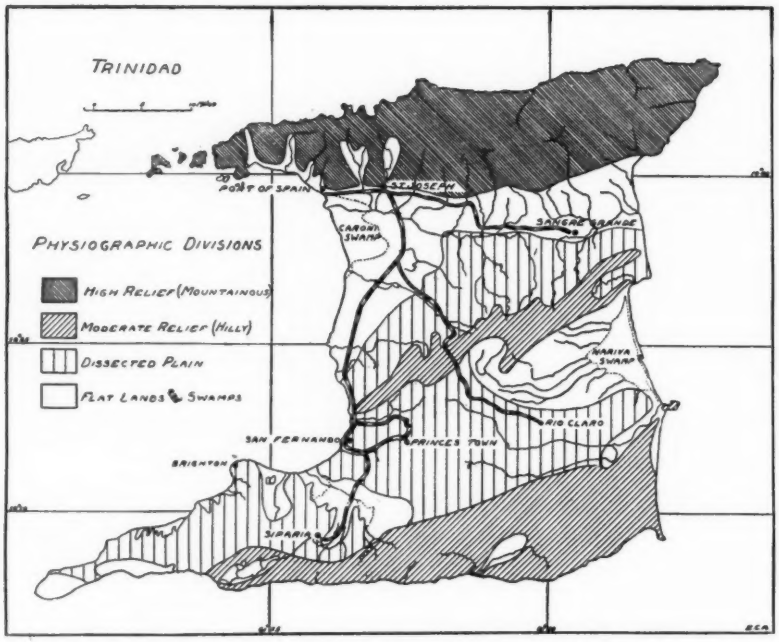

FIG. 1. Physiographic divisions of Trinidad

cacao, sugar cane, or coconuts is of primary importance. Altho only a little larger than the state of Rhode Island (1,862 sq. mi.), Trinidad enjoys a contrasted natural setting. Its surface varies from areas of swamp land close to sea level, to rugged, forest clad mountains in the Northern Range, reaching elevations of 3,000 feet.

[1] For other more detailed studies of Trinidad see the following papers by the same author:

The Pitch Lake, Trinidad, *Jour. of Geog.*, V. 24, p. 212

The Climate of Trinidad, *Mo. Weather Rev.*, V. 53, p. 71

Geographic Factors in the Trinidad Coconut Industry. *Economic Geog.*, V. 2, p. 108

A Geographic Reconnaissance of Trinidad, *Economic Geog.*, V. 3, p. 87

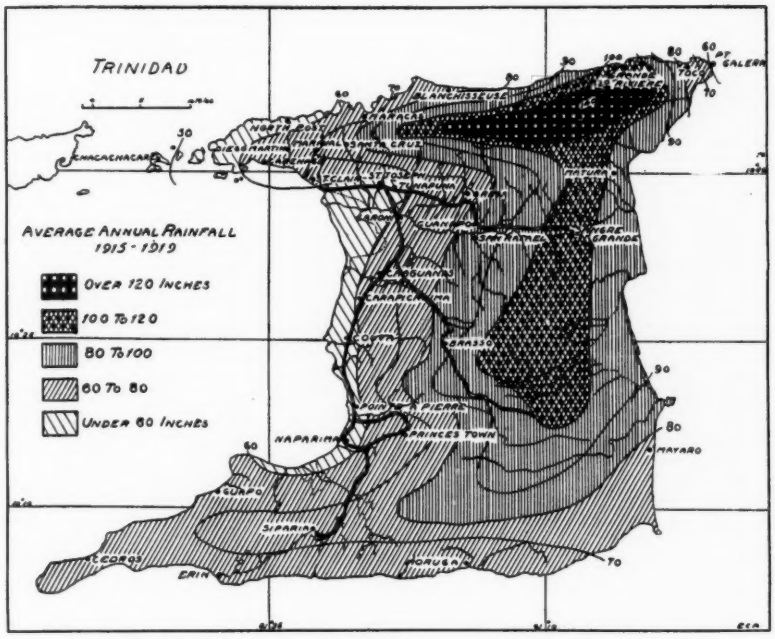

FIG. 2. Distribution of rainfall. Compare with Fig. 1

The rainfall, too, is less than 50 inches in the western part, and over 150 inches in the northeast (Fig. 2). At these latitudes where evaporation is high, less than 50 inches is reflected in a xerophytic

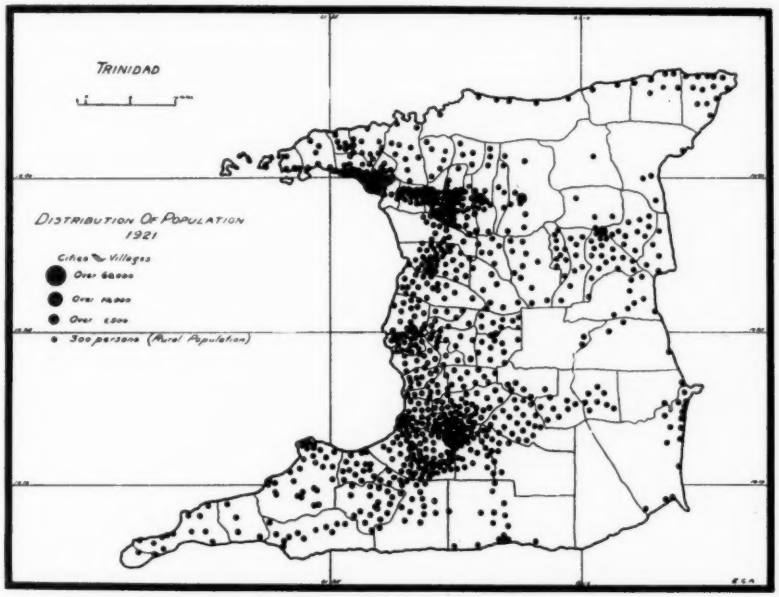

FIG. 3. Distribution of population

vegetation; while the rainier localities are characterized by vigorous forests. These contrasts result in varied types of agriculture, which in turn contribute to the economic stability of this colony of Great Britain.

The population of Trinidad (Fig. 3), about 350,000, is concentrated in the drier parts of the island, and more particularly in the area devoted to the cultivation of sugar cane (Fig. 4). Here great numbers of East Indians, imported from Calcutta under contract, work in the sugar fields. The parts of Trinidad which are devoted

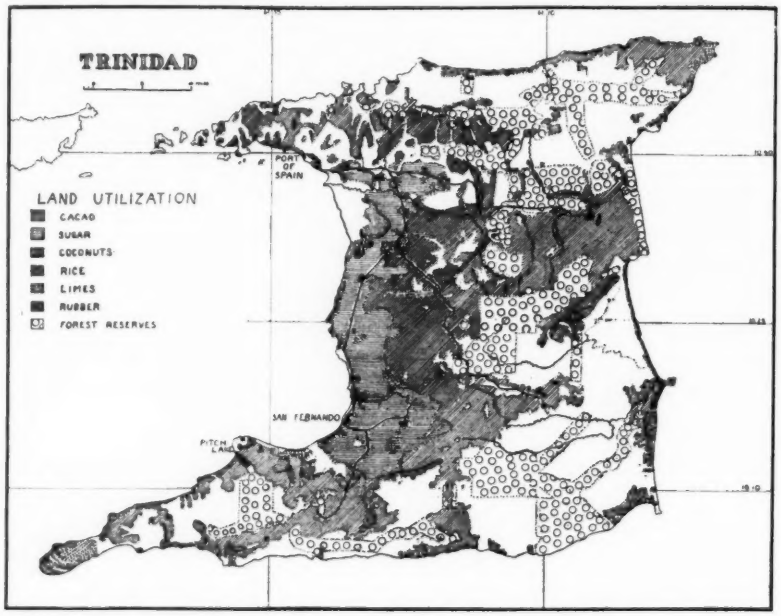

FIG. 4. Land utilization. Compare with Figures 1, 2, and 3

to the other major crops, cacao and coconuts, are marked by a sparser population, since these corps in this region are extensively grown as forest products, which require much less labor than the intensively cultivated sugar cane. Areas of virgin forest may still be found in the forest reserves (Fig. 4).

The following passages are descriptive of the landscape forms of a few of Trinidad's chief geographic divisions.

THE SUGAR DISTRICT

The sugar district is for the most part cleared of trees. A few remaining patches of cacao or groves of coconuts, and the tall Royal Palms which mark the villages, stand out conspicuously. In

FIG. 5. Sugar lands near San Fernando. School house and children in the middle distance

the Dissected Plain (Fig. 1) the land is gently undulating, with flattish, youthful hill crests, and narrow young valleys, but with rounded outline such as is characteristic of areas of moderate uplift (Fig 5). In the Caroni Plain, however, the land is flat, and here drainage ditches line the fields of cane, exposing a black, rich-looking soil. Steam tractors and animals are sometimes used to plow in this area; whereas only hoe cultivation is seen in the southern

FIG. 6. East Indian workers in a sugar district village

community. The numerous workers of the sugar district live together in villages, which are generally composed of one story, white-washed, wooden homes, roofed with corrugated iron, lining either side of the road (Fig. 6). The homes of the estate managers and overseers are more pretentious, and are set off by themselves, usually on a bit of higher ground where the wind is unobstructed, and where mosquitoes are fewer. A few large iron-roofed sheds of modern construction surrounded by substantial white wooden buildings mark the sugar centrals where the cane is refined. These centrals are connected with the surrounding cane fields by narrow

FIG. 7. Harvesting sugar cane in Trinidad

gauge company railroads, over which, in harvest time (Fig. 7), the freshly cut cane is rushed to the mill. A system of paved automobile roads provides easy communication thruout the district; and a standard guage steam railroad line thru the heart of the district provides an outlet to Port of Spain (Fig. 1). One of the notable features of almost all parts of Trinidad, which is especially noticeable in the sugar district, is the excellent system of paved roads—in part the result of the nearby source of cheap paving material.

THE CACAO DISTRICT

The cacao district covers a large part of Trinidad (Fig. 4), extending from the Northern Range to the southern shore. Within this district there are several possible subdivisions based on the differing character of the surface, soil, rainfall, or other conditions. The cacao district is a unit only in the production of cacao. The

following note covers only the section in the valleys of the Northern Range, where some of the richest cacao lands are to be found.

The southwestern part of the Northern Range is marked by a succession of bottle-shaped, flat-floored valleys, surrounded by steep mountain ridges, and leading out to the Caroni Plain to the south by narrow antecedent gorges (Fig. 1). In this area the cacao is grown on the valley floors and partly up the slopes of the surrounding ridges. The low cacao trees are carefully shaded from the sun by the taller *bois immortelle,* so that the atmosphere is extremely hot and damp (Fig. 8). In the early morning the valleys

FIG. 8. View inside a cacao plantation. Note the ripe pods nearly ready for picking. The air inside the cacao forest is extremely damp and hot

are often filled with fog, (Fig. 9), the product of air drainage during the night. This mist breaks up very quickly when the sun rises; but the air in the cacao forest remains oppressively humid, like the steamy air of a shower bath. As the day progresses large cumulus clouds begin to form on the mountain slopes, and, sweeping westward along the Northern Range, bring drenching downpours of rain at intervals thruout the day. The rolling thunder, the swish of rain on the leaves of the forest, and the roar of rain on the iron roofs of the houses are often repeated sounds.

The cacao workers live on the estates. In a clearing are grouped the cacao drying sheds, the homes of the workers, and, where possible dominating the rest of the group from a rise of ground, the

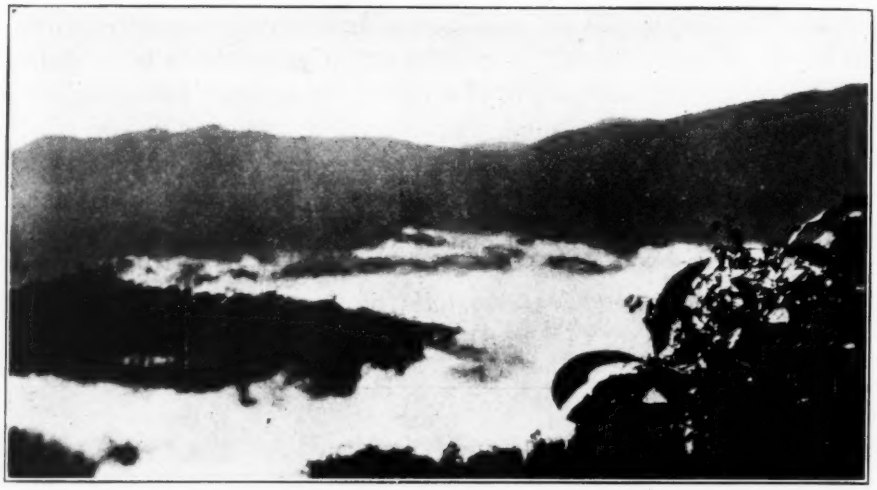

FIG. 9. Valley of the Northern Range filled with fog in the early morning

home of the estate owner or manager with its broad verandahs, and its sharply pitched, red-painted iron roof (Figs. 10 and 11). Very little attention is given to cultivation on these estates, aside from the construction of drains on the flat valley floors. Furthermore there is little else but cacao grown, excepting for the chance fruit trees near the estate buildings. No stock is maintained. However, on one or two of the more progressive estates there is some diversi-

FIG. 10. Group of buildings on a cacao estate. The hills in the background are planted to cacao, shaded by taller trees. The manager's home is on the extreme right of the group. Drying sheds in the foreground

FIG. 11. Another view of cacao drying sheds. The sliding roof covers the platform when it rains

fication: rubber is planted on poorer soil areas where it can thrive better than cacao which is more exacting in its soil requirements; (Fig. 12) or coffee is grown in hedges along the roads. Outside of a few instances, the cacao industry is poorly harmonized with the

FIG. 12. Hevea rubber on a cacao estate in Trinidad. Rubber can be grown on poor soil areas, thus diversifying the crops of the cacao estate

natural setting, since trees are set out in a similar way on all kinds of soils, on different slopes, in areas of different rainfall—all without regard to the effect of these natural conditions on cacao growth.

THE NORTHERN RANGE

The Northern Range is a recently uplifted mountain mass, deeply eroded by the vigorous streams fed by heavy rains (Fig. 2). The valleys are deep and steep sided. The ridge slopes are concave, and the divides are extremely narrow and sharp. This concavity of slope and sharpness of divide outside of glaciated areas is characteristic of rapid and recent uplift; and these features are emphasized in the rainy low latitudes until they are more characteristic of maturity of the erosion cycle than the convex, rounded slopes of the "normal" cycle in humid middle latitudes. Fresh rock exposures are seen very infrequently since decomposition has gone to great depths. This soft, watersoaked soil is in most places, insecure and, when the forest is removed, is carried rapidly to the valley bottoms. The rapid wash from the valley sides causes the accumulation at the base of the slopes, which, together with the over-steepening of the upper slopes, creates the concave form. Roads or trails along the valley sides, or over the ridges are difficult to construct and doubly difficult to maintain. Land slips are frequent in spite of retaining walls of logs, or clumps of live bamboo planted to hold the loose material in place.

The cacao estates in the Northern Range, described in the previous note, are located south of the main divide. Access to Port of Spain is relatively easy. North of the divide, however, access is very difficult. Only trails lead over the ridge, and these are frequently out of repair. The products of the northern slope are sent down to the north coast, and shipped to Port of Spain on a coasting steamer.

One of the most isolated portions of Trinidad, therefore, may be found on the north side of this divide, and back of the coconut estates along the immediate north coast (Fig. 4). Much of the land in this district is unused. There is a fairly large number of peasant holdings, however, scattered in isolated units, separated by stretches of forest. Usually a peasant takes out an "estate" stretching from the valley bottom to the lower edge of the forest reserve, which runs along the higher, steeper slopes and protects the watersheds (Fig. 4). Usually cacao is set out in the protected valley bottoms and lower slopes, and in this district there are re-

FIG. 13. Peasant home in the Northern Range of Trinidad

stricted areas of first class cacao sites. The cacao, as elsewhere, is densely shaded. Higher up, however, the land is cleared, and corn and bananas are planted. Still higher the huge trees of the virgin forest seem to tower over the small patch of cleared land below, protecting it from the inevitable result of cleared ridge tops in such a climate.

The peasant home is perched somewhere about mid-way up the slope, on the nose of a side ridge if such is to be found. The house

FIG. 14. Rural home half hidden among fruit trees planted around it

is built of mud, held in place by a basket-work of poles and small branches interwoven. The roof is thatch (Fig. 13). Poles across the tops of the walls, just under the thatch, with a few blankets stretched across them, provide sleeping quarters. Cooking is done in one corner of the hut under the protection of the roof. The hut is usually all but hidden among bushes and trees which furnish pepper, mangoes, avocados, bananas, and other fruits (Fig. 14). A small garden patch, almost lost among the weeds, is to be found nearby. These peasant proprietors are usually either East Indians (Fig. 15), who have worked out their contracts with the sugar

FIG. 15. Family of East Indian small land owners in the Northern Range of Trinidad

companies and have elected to become independent land owners, or Negroes, more thrifty than is common for that race in Trinidad.

THE COCAL, A COCONUT DISTRICT

The east coast of Trinidad is exposed to the full sweep of the open Atlantic. The waves have cut steep sea cliffs where the mountainous or hilly belts border the sea (Fig. 1); and across the sea face of the extensive Nariva Swamp, the shore currents have constructed a beautiful crescentic beach of glistening white sand, nine miles, more or less, in length. This sand bar is only a few hundred feet in width, on one side pounded by the Atlantic surf, on the other merging into the tangled labyrinth of a mangrove swamp,

with its intricate channels of brownish water, and its dangerous malarial mosquitoes. The swamp waters seeping into the sea thru the loose sand of the bar have imparted to the soil a high organic content. On the inner edge of the bar the soil has a rich black color.

This is an ideal natural setting for coconuts (Fig. 15). Coconuts require especially loose soil, thru which there is a constant seepage of ground water. Clay soils, where water may become stagnant, are poorly suited to coconut palms. Coconuts do not require salt water: but they are commonly found bordering the sea in such situations as the one we are describing, because here that favorable combination of sandy soil and constantly moving ground

FIG. 16. Coconut forest along Nariva Beach in eastern Trinidad

water is most commonly to be found. Along Nariva Beach, the richness of the soil resulting from the percolation of the swamp waters adds another favorable element to the site. Here no fertilizer needs to be used, because the soil fertility is constantly replenished by nature. In fact the coconut husks, which in most coconut estates are returned to the soil as fertilizer, are here used as fuel in a steam drying plant for copra. Yet without much care, the Cocal yields heavy crops of coconuts each year (Fig. 16).

The Trade Wind sweeps onto this eastern coast of Trinidad bringing with it a great deal of moisture. This moisture forms the heavy showers which occur every day in the belt of over 100 inches of rainfall just a little inland from the sea (Fig 2). The humidity is very high, even along the coast—so high that metal rusts very

quickly. Electric light fixtures corrode; nails rust out leaving brownish stains along the outside of the houses, and making advisable the use of wooden pegs instead of nails; the corrugated iron roofs which characterize most ports of Trinidad are here replaced with cedar shingles or thatch. In the coconut industry of other parts of the island, the copra is dried on platforms in the sun; but at the Cocal a steam drying plant is used—which fortunately can be cheaply operated owing to the use of the coconut husks as fuel.

Along the immediate coast the malarial mosquitoes are never present as long as the Trade Wind blows. But sometimes in the night during the high sun (northern summer) months, the Trade dies down and is replaced by a very gentle land breeze, reeking with the odors of the swamp, and carrying with it clouds of mosquitoes. At such times malaria is a serious menace to the inhabitants.

TRINIDAD AS A WHOLE

The economic life of Trinidad is closely related to the cacao crop. Correlations can be made between the earnings of the street car company in Port of Spain, or the sale of cheap jewelry, or the overturn of goods in retail stores, with the prosperity of the cacao industry. Cacao has always been Trinidad's chief item of export. At the present time, therefore, Trinidad's prosperity is at a low ebb, and would have reached dangerously low conditions were it not for the variety of other crops and industries in the colony. The great decrease in the consumption of chocolate in central Europe, and the great increase in the production of cacao in the Gold Coast of Africa, has brought great hardships to the American producers of cacao—Trinidad, Venezuela, and Ecuador. Trinidad's cacao is of high value due to its superior quality; but the tremendous overproduction of cacao in the world as a whole has brought the price so low that in many of the Trinidad estates, especially those located on poor lands, the income was not great enough to pay the cost of picking. At the present time, however, prices are again rising, and probably there will be a renewed term of prosperity for the planters. A very good result of such a period of depression will be the elimination of cacao estates located on lands unsuited to cacao production. While such changes of land use are often disastrous to individual planters, the economic stability of the colony as a whole increases with each step toward a closer and more accurate adjustment to the natural conditions.

NORTHWARD HO FROM CAPE TOWN!

IDA BELLE TAYLOR
Dallas, Texas

Problem. Why Build the Cape-to-Cairo Railroad?

Method. Study-recitation.

Material.
1. Pamphlets on Africa—South African Railways. Office of General Manager of Railways and Harbors, Capetown, U. of S. A.
2. Human Geography (Regions and Trade). J. Russell Smith. The John C. Winston Co., Chicago, 1922
3. World Book, Vol. II. W. F. Quarrie & Co., Chicago 1919

General Statement. The African continent is a vast triangular land mass yet to be developed by white man. It comprises many political divisions which are characterized by great, distinct and typical territorial regions.

Class Discussion. What are political divisions and territorial regions?

Statement of Problems. Africa was the "Dark Continent" and the "white man's grave." What is the British Empire doing to change these conditions?

Development of the Lesson. As it is given in the following outline and discussion. The teacher telling to the class, the topics of outline, which must be "told back" to her and fellow classmates next day by members of the class. This lesson will require at least two days. Put the outline on the board. Have the students at the board drawing the map of Africa and illustrating all points and places mentioned by the teacher and class. At the beginning of the second day's recitation, the class reviews what the teacher has told of "old material," then she tells the story further.

Outline

I. Surface features and climates of Africa
   - A. The white man's South Africa
     Agricultural and grass lands
   - B. Central Africa (Tropic forests and tropic grass lands)
     Mineral, agricultural and animal products
   - C. Northern Africa
     England's rescue of Egypt

Use for this lesson material, maps of Africa, pictures from any source obtainable, newspaper clippings.

II. Early history of the region and of the road
  A. In 1887 the project was first brought to the attention of the "Collossus" —Cecil John Rhodes
  B. Sir Charles Metcalf was the engineer
  C. Alfred Beit financed the project
  D. George Pauling and Alfred Lawley built the road
III. The route and the road (The Spine)
  A. One-half of the 7,000 miles is by rail
  B. Part of the other half is by steamers on the Great Lakes and rivers of Africa
  C. The remaining part is by a motor ride of 800 miles
  D. Divisions of the road
    1. Cape Town to the Congo
    2. The Congo (Lake Albert Nyanza) to the Sudan
    3. The Sudan to Khartum
    4. Khartum to Cairo
    5. Cairo to Alexandria
  E. The Rhodesian Express
    1. Scenery
      a. Victorial Falls on the Zambezi
      b. Sub-tropical vegetation
      c. Other sights
    2. Route
      a. Rail
      b. Steamer on Congo
      c. Motor route
      d. 100 mile trek by caravan
      e. Steamer on the Nile
      f. Rail to the Mediterranean Sea
IV. Comparisons with other transcontinental railways
  A. Central Pacific of the United States
  B. Trans-Siberian of the Russian Empire

THE WORLD'S GREATEST TRUNK-LINE

Everyone has by this time heard and knows something of the Cape-to-Cairo Railway. Many have a hazy idea that a railway train leaves Cape Town, crosses Africa from south to north, or vice versa, and within so many days emerges at Cairo. Comparatively few people know that barely two-thirds of the journey of 7,000 miles can be made by train, the rest being by steamers on the Congo and Nile rivers, with a bracing 800 mile motor ride across the great Semliki forests of the Equatorial Congo to the Nile river.

But before we talk on the road and its building, we must acquaint ourselves somewhat with a few of the other important points of the greatly interesting African Continent. We commonly think of Africa as being divided into three great temperature

belts of Southern, Central and Northern Africa, but within each of these great divisions, nature has fashioned strikingly characteristic territorial regions of the marked geographical type.

The entire South Africa cannot be called the "White Man's South Africa" as this comprises only the Cape Section, which is another California in climate; the Natal Coast, which is a Florida type; and the Transvaal and Orange Free State, which have a climate like New Mexico. These countries export fruits such as peaches, oranges, lemons, apples, apricots, as well as garden truck by refrigerator ships.

Rhodesia of South Africa, and another Abyssinia, is the great southern grass land. The dried grass becomes a standing hay for cattle, sheep and goats.

Climate divides Central Africa into the great Tropic Forest Region and Tropic Grasslands. While mining is by far the most important industry of South Africa, minerals such as tin, copper and gold are also found in the lower part of the Belgian Congo. Yet the grassland animals of the Sudan such as the ostrich, giraffe and antelope, and the pumpkins, peanuts, beans and corn of the agricultural region are more common than the mineral products.

The "lower story" of the dark forests is the home of thousands of animals and the chattering monkeys. Many brilliantly colored birds and butterflies live in the "upper story" of the canopy of the trees which is made by the dense foliage and intertwined vines. "The huge beasts of the 'lower story' in the forests wander about and prowl into the Sudan to find the grass eating animals there."

Today almost everything is changed in that part of Northern Africa which is called Egypt. It has been the general impression that England obtained Egypt by the process of "grabbing" and has followed the policy of "sitting on it" so as to keep anybody else from getting it. But if this be true it is evident that the British Empire has helped Egypt very greatly. In Khartoum, Cairo and other cities the increased prosperity speaks of England's efforts. New cities have risen, bright and cleanly-dressed children pass one in the streets on their way to and from school, new forms of trade are springing up, the blacks are being trained into modern agriculturists, water conservation is being taught by such concrete examples as the Assuan Dam, and general prosperity reigns where bloodthirsty misrule and constant famines were form-

erly to be found. Great Britian has now given Egypt a form of independent sovereignty.

The history of the Cape-to-Cairo route by rail has no ancient dates. In 1887 the project was first brought to the attention of Cecil John Rhodes—"The Colossus." It was referred to Sir Charles Metcalf, who may be deservedly called the engineer. Cecil Rhodes thought out the grand scheme on broad lines, Alfred Beit financed it, Metcalf surveyed and drafted the route and George Pauling and Alfred Lawley built it. These men were backed by other "big-minded" Englishmen after the passing of Rhodes and others.

Space does not allow us to deal fully even in a most modest manner with the construction of this vast "spine" of rails thru the length of the African continent. The history of the building of the railway from "the Cape" to the Congo as it is today is simple compared with the other divisions. By 1887 a railway had been built from Cape Town to the diamond fields of Kimberly. With the development of these diamond fields, which give us so many beautiful stones today, came the money with which was opened to the world the great gold fields of the Transvaal. The city of Johannesburg is the center of the gold mining industry and is the largest city in South Africa. After England worked these gold fields on the very largest scale, it had the funds to extend the railway from Kimberly to Rhodesia. The station of Bulawayo, 1250 miles north of Cape Town, was opened in December 1897. Then these expert engineers surveyed the line past and thru the Wankie coal mines of Rhodesia to the Victoria Falls of the Zambesi. The construction cost of one mile of road in Rhodesia was about $22,500. In some parts the cost of actual construction was very light, in others it was very heavy. To feed the workmen was a stupendous undertaking and the cost of medical attention to keep them well and able to work, was another heavy expense. All the material used had to be brought from great distances, yet in some parts of Rhodesia the track was laid at the rapid rate of 492 miles in 500 working days.

Now when the Zambesi was approached, the great engineering problems challenged the experts, but these men were determined to girdle this vast gorge of the Victoria Falls; so across it was thrown, just below the Falls, the finest and highest Cantilever bridge that has ever been constructed. Once the "iron horse" had

reached the Victoria Falls, the cry of "Northward Ho!" was taken up with vigor and they went on thru the fever-stricken districts, over the Broken Hill zinc mines, crossing another great river with a bridge of 1800 feet span. Hundreds of men died, many white men came back to civilization with health permanently impaired; but on northward they went thru the copper mines of the Belgian Congo, over the tin and gold areas to the navigable Congo.

The river route thru the Belgian Congo ends at Stanleyville, the official capital of Belgium's colony in Central Africa. Leaving Stanleyville, a bracing motor ride takes you today nearly 800 miles across the great forests to Lake Albert. Here the saloon steamers await the Cape-to-Cairo tourist to take him north on the "Albert Nile" 165 miles. We are at this point 1,185 miles south of Khartoum and now enter on a hundred mile trek over land as far as Rejaf on the mouth of the upper Nile in the Egyptian Sudan. It is said that the physical features of the rugged mountain country are so difficult that it is unlikely that a railway or motor road will ever be built for this reason a fairly comfortable caravan route has been constructed, such that many lady travelers have gone over it safely.

At Rejaf-Gondokoro we find a comfortable Sudan Government steamer, which maintains a regular service to Khartoum twice monthly on the White Nile. At Kosti we pass under the great bridge crossing the White Nile. Those who desire to do so may leave the boat here to board a train to Khartoum to Cairo and thence to Alexandria.

Today we have the outstanding fact that you can get into one of the most comfortable saloons of the South African or Rhodesian express trains at Cape Town on any Monday afternoon and step out of said saloon six days later at Bukaha on the banks of the navigable Congo. You pass in that week thru the unsurpassed grandeur of subtropical vegetation and incidentally see the Victoria Falls, which Cecil Rhodes never did as he was fatally stricken with malaria seventy miles south while en route to see them.

After leaving the Rhodesian Express of the rail route, you are enchanted by the steamer route on the Congo, then the never-to-be-forgotten motor ride over the Sudan, now the caravan trek of 100 miles in upper Egypt, next you board the Nile steamer to Kosti, thence take another rail journey to the coast of the Mediterranean if you prefer the Pullman sleeper to the Nile steamer.

This great "engineering triumph," which aids England to wield world dominion, may be compared to one of our own transcontinental lines, the Central Pacific. The building of this railroad, our first interoceanic railway, was begun in 1863 and finished in 1869, during the period of Reconstruction after the Civil War. It aided in bringing the United States to a oneness of spirit which was so much needed. Our engineers and workmen triumphed over arid prairies, desert plateaus, lofty mountains that reach far above the snow line, and hostile Indians, to connect the two great oceans of the Atlantic and Pacific, a distance of between two and three thousand miles. We cried Westward Ho! England cried Northward Ho! and Russia cried Eastward Ho! when building its great intercontinental railway, the Trans-Siberian. Let no one forget what it meant to Russia and the world when it made its "new light" creep, almost unnoticed from out of the Siberian forest, down the banks of the Siberian rivers to Vladivostok and Port Arthur, a distance of some 4,000 miles. Despite checks and defeats, this almost curveless line, aided by connecting lines of Europe, joins also the Atlantic with the Pacific Ocean.

Let them also remember how many costly lives, how much suffering, how much treasure, have been given by those who participated in the building and the success of the great "Cape-to-Cairo Railway and River Route."

UNIT TOPICS SUITABLE FOR JUNIOR HIGH SCHOOL GEOGRAPHY*

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INTRODUCTION TO THE PROBLEM

The possible choice in the selection of units of work suitable for junior high school pupils is limited only by the interests and the capability of the students, the ingenuity of the instructor, and the time allotment on the school program. Hence, I shall not be dogmatic, but shall only suggest certain principles which I believe should be kept in mind in making the selection of units; certain goals which I believe it is desirable to reach; and enough situa-

*Presented at Philadelphia Meeting of the National Council of Geography Teachers, December 28, 1926.

tions to show how the principles operate in actual school room practice.

In a group of this kind, there is obviously little need to do more than recall the peculiar functions of geography teaching. These will be evident in a consideration of the principles which help the instructor to select the units to be presented. However, in a zest for the subject itself some may not readily recall that for adolescents, work must be planned which recognizes a desire on the part of the pupil to read widely, to acquire new words, and a tendency to be argumentative. Coincident with this comes a gradually enlarged power of reasoning. Excess energy may show itself in an altruistic and idealistic interest in others, but with it all there is a strong attachment for the practical. Behavior has a constant social reference, and a new outlook on the world manifests itself. The adult life and vocations make an appeal, while the spectacular and the dramatic have a distinct fascination.

Each individual is so susceptible to stimulation that this period offers great opportunity for education, but it is no time for standardization. There needs to be opportunity for self assertion, self realization, and self discovery, and apparently there is ample justification for the conclusion that educational practice should differ both in content and method for the pupil of adolescent age as compared with the pupil of pre-adolescent age.

If adolescence is a period of "storm and stress," of changeableness, intense emotions, self assertion, and a period in which the individual awakens to the significance of the industrial world and vocation and of a period in which he begins to judge, inquire, and reason, he must have material upon which to exercise these powers.

To meet the needs of such a group, should not the units be flexible and yet have a certain continuity? Should not the subject matter be stated in terms of the activities and environment of the people?

THE POINT OF VIEW

Probably the junior high school cannot give more than one full year to geography as a specialized subject, but since the interests of the children gradually change and since the administration of this unit of the educational system is separate from the first six grades, it seems wise not to leave any unfinished portion

of the work formerly done in the elementary school to be completed in the junior high school.

In the elementary school, the children have built up certain concepts of physical earth forms and have become conscious that all people do not live in the same way. They have some understanding of the relationship which exists between the physical environment and the necessities of life. In a way they understand the inter-dependence of people. In the junior high school the aim is to make them more conscious of the inter-dependence of people and of world unity by a more detailed study of their own country in its relations to the world. This is only possible with pupils older than those in the first six grades. It is our desire to have them acquire a more detailed knowledge, more geographic principles, and a point of view which will help them in solving the problems facing the community.

In the elementary school, the children have been acquiring ideas from specimens, pictures, maps and grafs, and have some skill in organizing the information. They have formulated some general principles and have formed the habit of setting out to accomplish a task and carrying it to a successful conclusion.

In the junior high school, we wish to have the pupils acquire greater ability to get information from books, maps and grafs. We wish them to assume more responsibility in carrying thru a unit of work and to acquire more ability in interpreting geographic factors that influence life. People are the central figure in both schools. In the intermediate grades, the emphasis has been placed on life in the different regions and the reasons for its distribution. In the junior high school, we go a step further and show the relations among the various regions, and emphasize more and more the relationship between man and his geographic environment.

Units of work must be based on the work of the earlier grades, must be adapted to the child's interest, must contain a fund of usable knowledge and present activities and situations which are significant to the children. We wish the youth to be brought in contact with the problems of today so that he will have a sympathetic understanding of the conditions and problems of other people. Knowledge about the issues of contemporary life and how they came to be what they are must be presented in enough situations that the knowledge may be translated into a tendency to act intelligently.

While this may all be true theoretically, such discussion alone is of little help to the classroom teacher. He is inquiring, "Just how shall I select the units which meet these requirements?"

We have talked in recent years about the fact that the results of geography teaching may be grouped under three heads: knowledge of facts and principles; power and skill to use the knowledge; and the attaining of desirable attitudes. Since our lives are regulated in every detail by the attitudes which we have, they take on all significance. Facts assume less importance. But attitudes are something which cannot be poured in by the instructor. They are something that are developed thru using facts and principles in many situations and constantly living the experience of others.

Altho the United States was studied in the fifth grade perhaps, the point of view in this year's work is entirely different and the regions for study are selected with a different purpose in mind. We now wish to show the relations among the different regions in a broad and general way, and wish to think of the United States in its world relations. The economic aspects will be analyzed. "Economic geography may be interpreted to mean a study of the different kinds of environment as they affect the different ways in which men get a living and deals with natural resources and industries and distribution of useful products."

For definiteness I shall suggest four general impressions which should remain with the children.

1. There is an inter-dependence existing among different sections of the United States and between the United States and other countries. In other words, there is world unity.
2. Certain sections of the United States are old industrially and certain sections are young. Trade arises because individuals and groups of people having different goods exchange their surplus to mutual advantage.
3. Methods of earning a living are not static, but are related to geographic environment. As economic conditions change in our country our trade relations with other countries change.
4. The United States is becoming more and more a manufacturing nation, and altho it is now and will continue to be interested, for some time at least, in the east-west trade of sending food and raw materials to Europe, it is interested in developing a trade with the tropics and with

countries which will supply raw materials and even temperate foods.

Regional Units

The accomplishment of these results necessitates a consideration of regional units of the United States and a study of supply regions and competing regions. The United States may be divided for study into five regions, namely: the South, the Middle West, the East, the Western Interior, and the Far West, using the commonly accepted meaning of the terms. I select these names because they are so commonly used in conversation and on the printed page; and what is more important, they are closely correlated with natural physiographic regions.

The Middle West may be roughly defined as lying between the Appalachian Plateau on the east and the black soil line of the Great Plains on the west. It extends from the northern border of the United States to the cotton belt. Thus, it will include parts of the Central Plain, the Great Plains, the Ozark Plateau and the Laurentian Upland.

The South extends from the southern boundary of the Middle West to the Gulf of Mexico and includes parts of the Appalachian Highland, the Atlantic and Gulf Coastal Plain, and the Great Plains.

The Western Interior is composed of the Western Great Plains, the Rocky Mountains, and the Inter-Mountain Plateaus. The Far West is made up of the Pacific Mountains and Lowlands, while the East reaches from the Appalachian Plateau to the Atlantic Ocean. It includes all of the Appalachian Highland and Atlantic Coastal Plain except the parts of these regions which belong to the South because of their economic life.

This is probably a different approach from that previously used. As each region in the United States is studied, similar kinds of work and crops may be located in other parts of the world to show competing countries or, if there is need for a particular product in any one section, areas of productions of the product may be located. This will give an opportunity for the study of the foreign region in any way that individual initiative dictates, and the capability of the children allows. All should know whether the region in a foreign country is an importing or exporting section of a particular commodity and in case it is an exporting country, all should know who can use the surplus.

Let us think for a few moments of the regions of the United States. Let us consider the South. We have said that the junior high school students are interested in practical problems of adult life and vocations, and that they have ability to solve problems within their range of experience. What are people thinking about the South today? Judging from recent books, newspaper and magazine articles, advertisements, photographs, and cartoons, it is apparent that while "Cotton is King," and will probably continue to be the major crop, there is need for diversification of farm products. Manufacturing is increasing rapidly and in at least one industry, cotton manufacturing, the South is becoming a competitor of New England. Are not problems based on these facts well within the range of pupils of this age?

Principles Underlying the Selection and Presentation of Units of Work

To be worth while, a geography problem should be worthy of solving from the standpoint of the pupil's contacts and interest in the work, be useful in the future, and awaken his initiative; should involve the relationship between man and earth; should develop certain habits and attitudes not yet acquired but worth acquiring, or produce greater skill in the abilities already developed to a degree; should require the use of tools which he is capable of using; should develop feelings which lead toward open mindedness and a realization of mutual helpfulness.

It is important that the study of the relationship between man and earth be pursued as a science so that the knowledge of physical features, climate and natural resources which are determining factors may be definite and exact.

The teaching of any unit involves six steps.

Motivation. In this case the problem may easily be brought before the children by a discussion of pictures, newspapers and magazine clippings, cartoons, and advertisements. I have selected a few clippings which might be used to bring a problem before the class. The following statements were captions used with a photograph in a newspaper of recent date.

Record Cotton Crop.—This picture taken in a southern field aids one in understanding the size of the American crop this year. Cotton growers, after some had destroyed their surplus, appealed for help in finding a world market. Many southerners predict that this year's over production may result in more diversified crops in the future.

Many Southern papers argue earnestly for crop diversification, while admitting that King Cotton is a monarch who relinquishes his hold with extreme reluctance.

Cartoonists picture reduced acreage as a panacea for all ills. The Southern Railway calls attention to the cheap and abundant electricity that is making the South a manufacturing center. This statement seen on a placard in a southern bank a few years ago might show the need for diversification for another reason and would help to bring the problem of the South before the pupils: "We loan money on cattle and corn, not on cotton."

A discussion of the reasons which prompted the small town in Alabama to erect a monument to the cotton boll weevil might serve to help make the problem real. Such problems as the following would probably be set up during the above discussion: "Why is Cotton King in the South?" "What are the possibilities for diversification of crops and industries in the South?" Thru such procedure the discussion of these or similar problems becomes to each student a piece of purposeful activity. The class will be able to recall bits of conversation heard in the home, talks on the radio and facts seen at the motion picture theaters.

Investigation. This involves a consideration of the problem and the location of material which has a bearing upon it. Questions such as these might be considered in discussing the first problem.

1. Why does cotton grow so well in the South?
2. Is there anything about cotton itself that makes it a desirable crop?
3. Will cotton grow anywhere else in the world?
4. How would other regions of the United States and the other countries of the world be affected if the South reduced the cotton acreage?

To answer the second problem, questions such as these might be considered.

1. What might be grown in place of cotton?
2. What are the possibilities for manufacturing?
3. How would such changes affect the trade relations of the South with other countries?

Organization of Material. This may be done by the child working alone or by the group as a whole.

Presenting the Material. A group or an individual presents material for accomplishing a common purpose. This will give opportunity for freedom in carrying out a chosen task. Children may make maps, grafs, write conversations or even dramatize portions of subject matter which have a bearing upon the selected problem.

Judging. In life we are judged on the basis of results obtained and the method of work. The same should be true in school.

Clinching. The children and teacher must consider which parts of the whole discussion are essential enough to be retained, what principles have been involved and used. The teacher must be sure that the four general impressions mentioned before have been stressed.

GOALS IN GEOGRAPHY TEACHING

The goals of teaching geography are not particularly well defined at present but it seems desirable to class the objectives into two groups according to the presence or absence of certain characteristics. This may be made clear by concrete cases. The objectives to be attained in teaching a pupil to spell differ from the objectives to be attained thru having the pupils listen to a good music recital or witness a dramatic performance. In teaching spelling, the outcome expected is a certain definite and easily recognized ability to do. On the other hand, the learning achieved in hearing a recital or witnessing a dramatic performance can be subjected to no profitable test of doing. We expect absorption, assimilation, growth, as a result, but the final outcome is so remote from the original stimulus that we do not seek to trace connections. Dr. Snedden has called the former the Alpha type of learning, and the latter the Beta type. The conspicuous result expected in the case of the Alpha type, is the ability to do, while the most tangible result expected in the Beta type is appreciation, or in one sense of the word—interest.

Geography is composite. Certain phases of the work should be so definitely taught that the resultant knowledge becomes as available as should the knowledge of the multiplication table, but all geography should not be so taught. Much should be talked over and the impression assimilated but no fixed and usable knowledge need be expected. The proper organization of outcomes involves a conscious and definite differentiation between Alpha and Beta portions of the subject matter. For each unit of work the teacher will think of the outcomes as the result of a combination of the two types of learning.

In a unit of this kind, geography work is no longer mere memory. There is a contact with everyday life that brings about sufficient interest and a real desire to accomplish the work. The

relationship between man and earth is emphasized. An opportunity comes to examine and interpret adjustments which groups of people must make to the combination of natural environmental conditions that exist in the region in which they live. An attempt is made to explain why men use the land and resources as they do. The advantages, disadvantages, opportunities, and handicaps of a region are considered. Facts are taught, but with a purpose. The various elements of the geographic environment play a part in answering the problem. They are shown to combine in various ways to influence man's life.

Other units of study might be formed around some such questions as these.

1. Why does one see so many advertisements about going to the Far West? How could one earn a living there?
2. What do you think of the statement of the lecturer who said "Southern California is the land of the future, New York the land of the past"?
3. Why does one read of the Middle West being the most independent civilized section in the world? Where in the world are people earning their living in a similar way?
4. How much truth is there in this statement, "People who live on the Great Plains are always uncertain about the results of their labor"? Are those who live in other natural physiographic regions of the same economic section equally uncertain?

Results to be Attained

By careful motivation children of this age will eagerly take over any one of dozens of worth while problems and at the end of the year, thru using facts in solving problems, will have a working knowledge of principles such as:

1. Life and work are influenced by geographical conditions.
2. A variety of physical features tends to produce a great variety of work.
3. As population increases people tend to use the land more efficiently.
4. A plain of low relief in the temperate zone, with a rainfall between twenty and fifty inches, with easy access to the sea and with ready supplies of coal and iron, is an ideal geographical setting for high industrial development.

5. Physical features help to determine routes of transportation.
6. Cities tend to grow where there are opportunities for manufacture, trade, and transportation, or where mode of transportation changes.
7. Regions of the same soil and climate tend to have the same kinds of products.
8. Climate is determined chiefly by latitude, altitude, and nearness to water, but in some places by an ocean current, presence of mountains, or both.

Facts such as these will be understood:

1. An understanding of life in the five economic regions of the United States and of competing and supply regions in other parts of the world.
2. An understanding of the term industrial age, and the accompanying trade conditions; for instance, regions such as the Middle West, the South, the Western Interior are exporters of food and raw material and importers of manufactured goods, while in the East the reverse is true.
3. A realization that the age of a section and of the United States is not static and that as the industrial age changes trade relations change.
4. An appreciation of the relation between the natural physiographic regions and the work of the people, and a knowledge of what each physiographic region contributes to the economic sections as a whole.

Such skills as these will be acquired:

1. An ability to predict markets and source of supplies for the United States.
2. Ability to picture places and people.
3. Ability to read maps, signs and symbols.
4. Ability to use latitude and longitude in locating places.
5. Power to use facts and principles to interpret geographical news items of the day.
6. Power to test accuracy of his own or others' thinking by stressing causal relations.
7. Ability to secure geographic information thru use of geographic tools.

Attitudes such as these will be developed:

1. A sympathetic understanding of conditions and people at home and abroad.
2. An interest in present day affairs that will make for better use of leisure.
3. An appreciation of the dignity of labor.
4. A desire to travel and read.

THE TEACHER'S PROBLEM

The ever present problem of the class room teacher is to find flexible units of work which will contribute something to the common integrating education, reasonably satisfy the pupil's immediate and assured future needs and reveal possibilities in the major fields of learning. Likewise he wishes to make it possible for the individual to make a survey of the world's work so that he may develop an appreciation of the right relations among vocational groups and make it possible for him to develop qualities which will allow him to take part in his community and give him an understanding of state, national and international problems. The geographer wishes to build up desirable attitudes thru power and skill in the use of facts and principles.

To meet the aims thus expressed by the junior high school administrator, by the expert in the general field of education, and by the geographer, the teacher tries to find units of work which fulfill all three aims and at the same time give a self imposed task to the pupil, so that he may find those conditions essential to human happiness, namely, a task, a plan for carrying it to a successful conclusion and a freedom in its execution.

SHIPS AT SEA, NO. 1

DOUGLAS C. RIDGLEY
University Cruise Around the World

A GENERAL VIEW OF THE "RYNDAM"

Most of the members of the University Cruise are having their first extended experience at sea. We have become accustomed to the *Ryndam* as our temporary home for a period of eight months. Some of the new and strange sights of the ship and its equipment have become commonplace. Many of our early questions about the ship and its operation have been answered thru our own experience and observations, or by officers and friends. Other questions remain unanswered and may be forgotten. In a number of brief articles prepared during the Cruise, we shall endeavor to give some salient facts about ships at sea, using the *Ryndam* as a concrete example with such added facts and comparisons as may be of interest.

If we take a vertical section of the *Ryndam*, from top to bottom, we find the following levels:

1. The Bridge. Here are the wheel house and the observation platforms at the upper level, and below the wheel house we find the chart room with all charts, maps, and instruments necessary for the safe navigation of the ship by the officers of the bridge.

2. The Hurricane or Boat Deck. Here we find the lifeboats installed for immediate use.

3. Promenade Deck, with its broad promenade and a limited number of staterooms known as the "deck cabins."

4. A—Deck, with dining room, staterooms, cruise manager's office, and hospital.

5. B—Deck, with its forecastle, staterooms, dining room, kitchen, and bakery.

6. C—Deck, with its newspaper office and press room, cabins, baggage rooms, library, and assembly room.

7. Tween Decks. This is cargo space from end to end of the ship. It is divided into compartments and is reached thru seven hatchways. There is no cargo on the Cruise. Portions are empty and unused. Other portions are used for storage of various kinds and for baggage. There are no Tween Decks amidships, as the engine room runs down to the bottom of the tween decks and coal bunkers occupy, on the sides of the engine room, the tween deck space.

8. Lower Hold. The lower hold is space below tween decks used for cargo. It is not now used. In No. 4 hatch is a deep tank used for cargo, if needed, or for water ballast if the ship has a light load. It now contains 1,620 tons of salt water for ballast. This is the only salt water carried on the ship during the Cruise.

9. The Double Bottom. The double bottom is below the lower hold. It is four and one-half feet in height, and is divided into ten compartments or water tanks. It has space for 1,820 tons of water. In preparing for the World Cruise, all tanks were cleaned and cemented. They were then filled with fresh water for two or three days, the water pumped out and the tanks refilled. This process was repeated until the tanks were in perfect condition for keeping the water supply clean and pure. Some

NOTE: In this and succeeding articles Dr. Ridgley gives an intimate description of "Ships at Sea"—those huge, complex mechanisms that carry passengers and freight to the uttermost parts of the earth and aid in making the world a unit. These articles should help both teacher and student to better appreciate one of our great agents of commerce.—EDITOR.

of the tanks near the engine room hold water for use of the engines for generating steam. Other tanks contain water for use in the wash basins and drinking fountains. From these tanks, water is pumped to a supply tank on the hurricane deck. From here it is distributed to all parts of the ship by gravity. Fresh water is taken on at ports having a supply of good water. About seventy-five tons of fresh water is used daily. The double bottom holds, when filled, sufficient water for three weeks.

Bath rooms are supplied with salt water pumped directly from the ocean to a supply tank on the hurricane deck, from which the water is distributed by gravity.

10. Keel and Plates of the Hull. These are the portions of the ship which are in contact with the water of the ocean.

The dimensions of the *Ryndam* are: length, 560 feet; width, 62 feet; vertical height from keel to bridge, 70 feet; from keel to top of smokestack, 115 feet. Gross tonnage, 22,070 tons.

PERSONNEL AND ITS ORGANIZATION

The officers and crew of a ship are responsible for the safe navigation of the sea, for the safety and comfort of the passengers, and for the proper care and handling of all cargo on the ship. Such responsibility requires effective organization and complete co-operation of a large group of workers. The general organization of officers and crew on the *Ryndam* is as follows:

1. Officers of the Bridge and Deck. The Bridge is in charge of the Captain and six officers: Chief Officer, two second officers, one third officer, and two fourth officers. The Captain has charge of all departments of the ship's organization and is in supreme command of the ship in all respects. The Chief Officer ranks next to the Captain and is always ready to take charge of the ship if necessary. Five officers are assigned to duty on the Bridge. The twenty-four hours of the day are divided into six watches of four hours each. The officers are assigned to the Bridge as follows.

12 to 4 A.M. and P.M., senior second officer and fourth officer
4 to 8 A.M. and P.M., junior second officer and fourth officer
8 to 12 A.M. and P.M., third officer

The four quartermasters, the carpenter and assistant, the boatswain and assistant are under the immediate command of the Chief Officer. The storekeeper, the lamp trimmer, eleven sailors, two ordinary sailors who are young and less experienced than sailors, and two boys are under the command of the boatswain, the carpenter, the boatswain, and assistant boatswain are petty officers.

The sailors constitute the deck crew. Their work includes making fast the ship when docking, casting off the ship when departing, dropping and weighing anchor, washing the deck and deck houses, keeping the lookout at night from the crow's nest, keeping life boats in order, painting the exposed portions of the ship as needed, and other duties as found necessary.

2. The Chief Engineer. The organization and watches of the Engine Room are similar to those of the Bridge. The Engine Room is in charge of the Chief Engineer, who has no watch, but is ready for duty at all times of special need. There are on the *Ryndam* two second engineers, two third engineers, two assistant engineers, and one electrician.

Working under the direction of the engineers are the foreman, boiler maker, storekeeper; six oilers, two on each watch; one assistant electrician; eighteen firemen, six on each watch; eighteen trimmers, six on each watch. The trimmers bring coal from the bunkers to the stoke hole, clean the fires, and throw the ashes overboard. The foreman, boiler maker, storekeeper, and oilers are petty officers. Two boys take care of the cabins for the crew.

The Chief Engineer has charge, not only of the engine room, but is responsible also for all electrical service including light, fans, bells, and special electrical service for dramatics; for the refrigeration plant where fresh meats, vegetables, and fruits are kept; for the water supply for the passengers; for pipes and hose for water and for heat.

3. The Purser. The purser's office requires the service of the purser, assistant purser, baggage master, clerk, two storekeepers, and two bar tenders. Soft drinks only are served at the bar on the Cruise. The purser makes all purchases of provisions and supplies for the ship. He pays the crew while at sea. He has charge of the safety deposit service. He prepares all clearance papers, and bills of health at all ports. He pays cash for traveler's checks, and handles all money received by the ship at the bar or at the store. He is, with the medical officer, the reception committee for the health officers and other officials who come aboard as the ship enters port.

4. The Chief Steward. The steward department has charge of all kinds of service for the passengers. The work is in charge of the Chief Steward assisted by two Hofmeesters who have immediate charge of the service in the two dining rooms. More than one-half of all the ship's personnel is under the direction and supervision of the Chief Steward. The force include thirty-six table stewards, eighteen room stewards, thirteen general service stewards, six mess room stewards, seven bath room stewards, three deck stewards, one smoking room steward, and three stewardesses. Six musicians furnish music at luncheon and dinner and on other occasions. The chief cook is assisted by six cook's mates, eight cooks, five bakers, two butchers, eight pantry men, and four pantry boys. A printer prints the daily menu cards, and a linen keeper attends to the linen. The ship's laundry requires nine workers, and the American laundry for the service of the passengers, gives employment to thirteen men. The barber has a well equipped barber shop. He also sells many articles to the passengers.

5. Medical Service. The medical service is in charge of a doctor and an assistant. In addition to the ship's doctor, the Cruise has provided additional medical advisers and hospital service for members of the Cruise.

6. Wireless Service. Two radio operators, responsible to the Captain, and a part of the deck force, are in charge of the wireless service. They work on six-hour shifts, thus keeping the ship in touch with radio messages at all times.

Summary of the number of persons on board.

THE CREW		THE PASSENGERS	
The Bridge and deck crew	34	Faculty	70
Engine Room	58	Men Students	375
Purser Service	8	Women Students	110
Steward Service	154		
Medical Service	2	Total	555
Total	256	Total persons on ship	811

The ship's personnel thus provides one person for approximately two passengers. This large group of 256 well organized workers is busy day and night thruout the 227 days of the Cruise providing 555 passengers with safe and comfortable passage of 33,000 miles around the world.

INSTRUMENTS, CHARTS, AND BOOKS FOR NAVIGATION

The *Ryndam* is equipped with all the instruments, charts, and books necessary for safe navigation of the sea in a cruise around the world. A list of the more important articles includes: standard compass, steering compass, six sextants, sun-bearing apparatus, two chronometers, charts for entire course, sailing directions, notice to mariners,

parallel ruler, pair of compasses, submarine clock signal, nautical almanacs, book for tides, thermometers, mercurial barometer, aneroid barometer, barograph, log for measuring speed of ship, sounding apparatus, depth meter, hand sounding leads, telegraph and telephones from Bridge to other parts of the ship, wireless outfit, flag code, Morse light, life preservers, or buoys, swimming jackets, water buckets, fire extinguishers, fire hose, Holmes lights, fire sockets for distress signal, several kinds of signal lights, gun for sending rope to another ship in distress, whistle, siren.

The Compass. The compasses are of supreme importance in navigation. They enable the officers to keep the true course of the ship as laid out on the navigation charts. The iron and steel used in the construction of the ship tend to interfere with the accurate operation of the compass needle. The standard compass is so mounted that it is influenced as little as possible by the iron and steel of the ship. On the *Ryndam,* the standard compass is mounted on a platform just aft of the Bridge. This gives clear vision of the entire horizen except a few degrees aft of the smoke stack. The large brass receptacle in which the compass is placed and by which it is protected from the weather is known as the Binnacle.

The steering compass is located in the wheel house in front of the wheel so that it is readily seen by the quartermaster, who operates the wheel and keeps the ship on its course.

During every watch, the officers of the Bridge test the compass and their bearings in order to make sure that the ship is kept on its true course as nearly as possible. The true course of the ship is determined from the navigation chart. Thus, as the *Ryndam* left Bangkok for Singapore, 850 miles distant, the Captain laid out on the sailing chart the course which the ship should take. A pencil line was drawn to indicate the course. The parallel ruler consists of two or three rulers so hinged together that the rulers may be readily drawn apart to establish parallel lines accurately between any two positions on the chart. The compass card is a circle on the chart, divided into degrees with true north indicated. The parallel ruler was then placed with one edge on the line indicating the true course and the other edge on the compass card. The true course was found to be south 24° east. The standard compass was then tested for variation and deviation from true north. The variation of the compass is measured by the angle that the compass needle is drawn from true north by the influence of the earth's magnetism. The variation is taken from the compass cards on the sailing chart where the variation is accurately entered for the locality. The deviation of the compass is measured by the angle that the compass needle is drawn from magnetic north by the influence of the iron and steel of the ship. On leaving Bangkok, the deviation was 1.0° west. If deviation or variation of the compass is to the east, it is called plus; if to the west, it is called minus. The algebraic sum of the deviation and variation is called the total error of the compass. On leaving Bangkok, the deviation of the standard compass was —1.0°, and the variation was +1.0°. The total error, therefore was zero. The true course, which was south 24° east, is kept by sailing south 24° east by the standard compass. The steering compass has the same variation as the standard compass, but its deviation is different from the standard compass, since the location differs from that of the standard compass with reference to the iron and steel of the ship. The officers of the bridge then compute the true direction as it would be indicated by the steering compass. On leaving Bangkok, the steering compass showed south 21° east.

On a small blackboard placed where it is readily seen by the quartermaster at the wheel, the officers write the results of their computations for the two compasses. On leaving Bangkok, the blackboard gave: standard compass, south 24° east, and the steering compass, south 21° east. With his steering compass and blackboard always in view, the quartermaster turns the wheel gently from side to side as required to keep

the ship's prow moving exactly in the direction indicated by the blackboard and the compass. Thus, the compasses are used and tested at every watch. It is evident that modern navigation could not be carried on without reliable compasses.

Sun-bearing Apparatus. The sun-bearing apparatus is designed to determine accurately and quickly the exact direction to the sun at any time that the sun is above the horizon and not obscured by clouds. The apparatus is mounted on the standard compass, but it is a separate instrument. It includes a collar that fits snugly around the upper portion of the compass and may be rotated readily around the compass in any direction. The collar supports an apparatus consisting of prisms thru which the sun may be seen and made to appear on the compass margin where the exact direction is then read. The direction to the sun can then be recorded accurately in degrees and tenths of a degree.

With the latitude, hour, and declination of the sun known, the ship's officer uses the tables in nautical almanacs and calculates the true direction of the sun. He then compares the compass reading made from the sun-bearing apparatus. The difference between the true direction and the compass direction to the sun is the total error of the compass. From this total error the magnetic variation is subtracted. The remainder is the deviation of the compass due to the iron and steel of the ship.

The same apparatus is used constantly for determining the bearing, or direction, of stars and moon, and the results are used in the same way as the observations made for the sun. The sun-bearing apparatus serves as an effective aid in determining the state of the compass, and thus enables the Captain and his officers to steer the ship on its true course as laid out on the chart.

The Sextant. The sextant is an instrument used for determining the altitude of the sun, moon, and stars. It is a metal instrument convenient for manipulating in the hands of the observer. The outer rim of the sextant is a 60° arc. It carries one movable mirror and one fixed mirror whereby the observor may bring the position as seen thru the lenses and prisms to appear on the horizon. The apparatus is then securely locked, and, by means of a graduated scale, the exact altitude of the sun in degrees and minutes is read.

At about ten minutes before noon by the sun, each officer of the Bridge, except the Captain, uses a sextant and takes his position on the Bridge for an observation of the sun for altitude at exact noon. Each officer takes his observation, and at a signal given by one of the officers on watch, the sextants are securely locked in place and read. A brief conference among the officers follows and the altitude of the sun at noon is agreed upon. The latitude as determined from this observation of the sun's altitude is then computed. The sextant is used also to determine the altitude of stars, planets, and moon. The latitude is determined from these observations as in the case of the sun. The longitude is determined from observations of the sun taken at 8 A.M., and the noon longitude carefully calculated from the 8 o'clock observation. Record of the noon position of the ship is made and the position marked on the chart. This position shows how nearly the ship has followed the true course. Small adjustments of the sailing directions are made in order to keep the ship very near its true course. A world map is mounted on the bulletin board of the ship. The noon positions of the ship each day is entered on the map with the date. The passengers can then trace on the world map, day by day, the course of the Cruise.

The compasses, the sun-bearing apparatus, and the sextants are the instruments in constant use for the single purpose of keeping the ship on its true course as laid out on the chart.

The Chronometer. The chronometer is a carefully constructed clock whose purpose is to keep exact Greenwich time, or the time of the prime meridian. The *Ryndam* carries

two chronometers constructed by different manufacturers and placed in special mountings in the chart room. Here they are examined by one of the officers on watch every twenty-four hours. These chronometers are carefully tested at the factory, but absolute accuracy is impossible in any time piece. When once placed on the ship, the chronometers are kept going by proper winding but they are never set forward or turned backward by the officers of the ship. A record book is kept near the chronometers, and as the ship receives daily, by radio, the absolute Greenwich time, the amount of error for each chronometer is entered in the record book. At the time this is written, one chronometer is 27 minutes slower and the other is 63 minutes faster that Greenwich time. The chronometers, with their time records corrected to agree with Greenwich time, assist the officers to calculate the longitude of the ship.

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